

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original): An image matching system for retrieving a reference image similar to an input image, the image matching system comprising:

means for making a match between the input image and a plurality of representative three-dimensional object models;

means for making a match between the reference image and the representative three-dimensional object models; and

means for retrieving the reference image similar to the input image by using a result of the match between the input image and the representative three-dimensional object models and a result of the match between the reference image and the representative three-dimensional object models.

2. (original): The image matching system according to claim 1, further comprising:

means for finding a reference three-dimensional object model associated with the reference image similar to the input image; and

means for newly retrieving the reference image similar to the input image by using the reference three-dimensional object model and the input image.

3. (original): The image matching system according to claim 1, further comprising:

means for finding a reference three-dimensional object model associated with the reference image similar to the input image;

conversion means for squaring an input condition of the input image with that of the reference image by converting the input image and/or the reference image on the basis of the reference three-dimensional object model; and

means for retrieving the reference image associated with the input image by making a match between the input image and reference image squared in input condition.

4. (original): The image matching system according to claim 3, wherein the conversion means previously converts the reference image, and squares an input condition of the input image with that of the reference image.

5. (original): The image matching system according to claim 1, comprising:
image input means for inputting the input image;
a representative three-dimensional object model storage section for storing a plurality of representative three-dimensional object models;

image generation means for generating at least one comparison image close in input condition to the input image every representative three-dimensional object model on the basis of the representative three-dimensional object models stored in the representative three-dimensional object model storage section;

image matching means for calculating a similarity between the input image and each of the comparison images generated by the image generation means, selecting a maximum similarity with respect to comparison images associated with each representative three-

dimensional object model, and regarding the maximum similarity as a similarity between the input image and the representative three-dimensional object model;

a reference image storage section for storing the reference images of objects;

a reference image matching result storage section for storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section; and

result matching means for extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section.

6. (original): The image matching system according to claim 5, further comprising:

three-dimensional object model registration means for registering representative three-dimensional object models in the representative three-dimensional object model storage section;

reference image registration means for registering reference images in the reference image storage section; and

reference image matching result update means for conducting calculation of the similarities using the image matching means, on a combination of a reference image and a representative three-dimensional object model newly generated by registration, when a new

representative three-dimensional object model is registered in the representative three-dimensional object model storage section by the three-dimensional object model registration means, or when a new reference image is registered in the reference image storage section by the reference image registration means, and adding a result of the calculation to results in the reference image matching result storage section.

7. (original): The image matching system according to claim 5, wherein
the image matching means calculates a similarity between the input image and a representative three-dimensional object model every partial region,
the reference image matching result storage section stores similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, every partial region, and

the result matching means extracts the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means every partial region and similarities between the reference images and the representative three-dimensional object models, stored in the reference image matching result storage section every partial region.

8. (original): The image matching system according to claim 5, wherein
the result matching means calculates similarities between similarities between the input image and the representative three-dimensional object models and similarities between the reference images and the representative three-dimensional object models, and in the calculation

provides the resultant similarities with weights on the basis of candidate precedence of similarities between the input image and the comparison images and the representative three-dimensional object models.

9. (original): The image matching system according to claim 2, comprising:

- image input means for inputting the input image;
- a representative three-dimensional object model storage section for storing a plurality of representative three-dimensional object models;
- image generation means for generating at least one comparison image close in input condition to the input image every representative three-dimensional object model on the basis of the representative three-dimensional object models stored in the representative three-dimensional object model storage section;
- image matching means for calculating a similarity between the input image and each of the comparison images generated by the image generation means, selecting a maximum similarity with respect to comparison images associated with each representative three-dimensional object model, and regarding the maximum similarity as a similarity between the input image and the representative three-dimensional object model;
- a reference image storage section for storing the reference images of objects;
- a reference image matching result storage section for storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section;

result matching means for extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section;

a reference three-dimensional object model storage section for storing reference three-dimensional object models associated with the reference images stored in the reference image storage section;

second image generation means for obtaining reference three-dimensional object models associated with reference images extracted from the result matching means, from the reference three-dimensional object model storage section, and generating at least one second comparison image close in input condition to the input image every reference three-dimensional object model on the basis of the obtained reference three-dimensional object models; and

second image matching means for calculating similarities between the input image and second comparison images generated by the second image generation means, selecting a maximum similarity from among second comparison images associated with each of the reference three-dimensional object models, and regarding the maximum similarity as a similarity between the input image and the reference three-dimensional object model.

10. (original): The image matching system according to claim 9, further comprising:

three-dimensional object model registration means for registering representative three-dimensional object models in the representative three-dimensional object model storage section;

reference image registration means for registering reference images in the reference image storage section; and

reference image matching result update means for conducting calculation of the similarities using the image matching means, on a combination of a reference image and a representative three-dimensional object model newly generated by registration, when a new representative three-dimensional object model is registered in the representative three-dimensional object model storage section by the three-dimensional object model registration means, or when a new reference image is registered in the reference image storage section by the reference image registration means, and adding a result of the calculation to results in the reference image matching result storage section; and

three-dimensional object model generation means responsive to registration of a similarity between the reference image and the representative three-dimensional object model in the reference image matching result storage section conducted by the reference image matching result update means, for generating the reference three-dimensional object model associated with the reference image by combining the representative three-dimensional object models stored in the representative three-dimensional object model storage section on the basis of the similarity, and registering the generated reference three-dimensional object model in the reference three-dimensional object model storage section.

11. (original): The image matching system according to claim 10, wherein

the three-dimensional object model generation means generates a reference three-dimensional object model associated with each reference image by combining representative three-dimensional object models stored in the representative three-dimensional object model storage section every partial region, on the basis of similarities obtained every partial region between reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, and registers the generated reference three-dimensional object model in the reference three-dimensional object model storage section.

12. (original): The image matching system according to claim 9, wherein
the image matching means calculates a similarity between the input image and a representative three-dimensional object model every partial region,

the reference image matching result storage section stores similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, every partial region, and

the result matching means extracts the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means every partial region and similarities between the reference images and the representative three-dimensional object models, stored in the reference image matching result storage section every partial region.

13. (original): The image matching system according to claim 9, wherein
the result matching means calculates similarities between similarities between the
input image and the representative three-dimensional object models and similarities between the
reference images and the representative three-dimensional object models, and in the calculation,
provides the resultant similarities with weights on the basis of candidate precedence of
similarities between the input image and the comparison images and the representative three-
dimensional object models.

14. (original): The image matching system according to claim 3, comprising:
image input means for inputting the input image;
a representative three-dimensional object model storage section for storing a
plurality of representative three-dimensional object models;
image generation means for generating at least one comparison image close in
input condition to the input image every representative three-dimensional object model on the
basis of the representative three-dimensional object models stored in the representative three-
dimensional object model storage section;
image matching means for calculating a similarity between the input image and
each of the comparison images generated by the image generation means, selecting a maximum
similarity with respect to comparison images associated with each representative three-
dimensional object model, and regarding the maximum similarity as a similarity between the
input image and the representative three-dimensional object model;
a reference image storage section for storing the reference images of objects;

a reference image matching result storage section for storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section;

result matching means for extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section;

a reference three-dimensional object model storage section for storing reference three-dimensional object models associated with the reference images stored in the reference image storage section;

image conversion means for obtaining reference three-dimensional object models associated with reference images extracted from the result matching means, from the reference three-dimensional object model storage section, squaring an input condition of the input image with that of the reference image extracted by the result matching means by converting the input image and/or the reference image extracted by the result matching means, on the basis of the obtained reference three-dimensional object models, and generating partial images respectively of the input image and the reference image squared in input condition with each other; and

partial image matching means for calculating a similarity between the partial image of the input image and the partial image of the reference image generated by the image conversion means.

15. (original): The image matching system according to claim 14, further comprising:

three-dimensional object model registration means for registering representative three-dimensional object models in the representative three-dimensional object model storage section;

reference image registration means for registering reference images in the reference image storage section; and

reference image matching result update means for conducting calculation of the similarities using the image matching means, on a combination of a reference image and a representative three-dimensional object model newly generated by registration, when a new representative three-dimensional object model is registered in the representative three-dimensional object model storage section by the three-dimensional object model registration means, or when a reference image is registered in the reference image storage section by the reference image registration means, and adding a result of the calculation to results in the reference image matching result storage section; and

three-dimensional object model generation means responsive to registration of a similarity between the reference image and the representative three-dimensional object model in the reference image matching result storage section conducted by the reference image matching result update means, for generating the reference three-dimensional object model associated with the reference image by combining the representative three-dimensional object models stored in the representative three-dimensional object model storage section on the basis of the similarity, and registering the generated reference three-dimensional object model in the reference three-dimensional object model storage section.

16. (original): The image matching system according to claim 15, wherein
the three-dimensional object model generation means generates a reference three-
dimensional object model associated with each reference image by combining representative
three-dimensional object models stored in the representative three-dimensional object model
storage section every partial region, on the basis of similarities obtained every partial region
between reference images stored in the reference image storage section and representative three-
dimensional object models stored in the representative three-dimensional object model storage
section, and registers the generated reference three-dimensional object model in the reference
three-dimensional object model storage section.

17. (original): The image matching system according to claim 14, wherein
the image matching means calculates a similarity between the input image and a
representative three-dimensional object model every partial region,
the reference image matching result storage section stores similarities between the
reference images stored in the reference image storage section and representative three-
dimensional object models stored in the representative three-dimensional object model storage
section, every partial region, and
the result matching means extracts the reference image similar to the input image
on the basis of similarities between the input image and the representative three-dimensional
object models calculated by the image matching means every partial region and similarities
between the reference images and the representative three-dimensional object models, stored in
the reference image matching result storage section every partial region.

18. (original): The image matching system according to claim 14, wherein the result matching means calculates similarities between similarities between the input image and the representative three-dimensional object models and similarities between the reference images and the representative three-dimensional object models, and in the calculation, provides the resultant similarities with weights on the basis of candidate precedence of similarities between the input image and the comparison images and the representative three-dimensional object models.

19. (original): The image matching system according to claim 1, wherein the object is a human face.

20. (original): An image matching method for retrieving a reference image similar to an input image, the image matching method comprising:

- a step of making a match between the input image and a plurality of representative three-dimensional object models;
- a step of making a match between the reference image and the representative three-dimensional object models; and
- a step of retrieving the reference image similar to the input image by using a result of the match between the input image and the representative three-dimensional object models and a result of the match between the reference image and the representative three-dimensional object models.

21. (original): The image matching method according to claim 20, further comprising:

a step of finding a reference three-dimensional object model associated with the reference image similar to the input image; and

a step of newly retrieving the reference image similar to the input image by using the reference three-dimensional object model and the input image.

22. (original): The image matching method according to claim 20, further comprising the steps of:

a step of finding a reference three-dimensional object model associated with the reference image similar to the input image;

a conversion step of squaring an input condition of the input image with that of the reference image by converting the input image and/or the reference image on the basis of the reference three-dimensional object model; and

a step of retrieving the reference image associated with the input image by making a match between the input image and reference image squared in input condition.

23. (original): The image matching method according to claim 22, wherein at the conversion step, the reference image is previously converted, and an input condition of the input image is squared with that of the reference image.

24. (original): The image matching method according to claim 20, comprising:
an image input step of inputting the input image;

a step of storing a plurality of representative three-dimensional object models in a representative three-dimensional object model storage section;

an image generation step of generating at least one comparison image close in input condition to the input image every representative three-dimensional object model on the basis of the representative three-dimensional object models stored in the representative three-dimensional object model storage section;

an image matching step of calculating a similarity between the input image and each of the comparison images generated by the image generation means, selecting a maximum similarity with respect to comparison images associated with each representative three-dimensional object model, and regarding the maximum similarity as a similarity between the input image and the representative three-dimensional object model;

a step of storing the reference images of objects in a reference image storage section;

a step of storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, in a reference image matching result storage section; and

a result matching step of extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section.

25. (original): The image matching method according to claim 24, further comprising:

a three-dimensional object model registration step of registering representative three-dimensional object models in the representative three-dimensional object model storage section;

a reference image registration step of registering reference images in the reference image storage section; and

a reference image matching result update step of conducting calculation of the similarities using the image matching means, on a combination of a reference image and a representative three-dimensional object model newly generated by registration, when a new representative three-dimensional object model is registered in the representative three-dimensional object model storage section by the three-dimensional object model registration means, or when a new reference image is registered in the reference image storage section by the reference image registration means, and adding a result of the calculation to results in the reference image matching result storage section.

26. (original): The image matching method according to claim 24, wherein at the image matching step, a similarity between the input image and a representative three-dimensional object model is calculated every partial region,

the reference image matching result storage section stores similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, every partial region, and

at the result matching step, the reference image similar to the input image is extracted on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means every partial region and similarities between the reference images and the representative three-dimensional object models, stored in the reference image matching result storage section every partial region.

27. (original): The image matching method according to claim 24, wherein at the result matching step, similarities between similarities between the input image and the representative three-dimensional object models and similarities between the reference images and the representative three-dimensional object models are calculated, and in the calculation the resultant similarities are provided with weights on the basis of candidate precedence of similarities between the input image and the comparison images and the representative three-dimensional object models.

28. (original): The image matching method according to claim 21, comprising:
an image input step of inputting the input image;
a step of storing a plurality of representative three-dimensional object models in a representative three-dimensional object model storage section;
an image generation step of generating at least one comparison image close in input condition to the input image every representative three-dimensional object model on the basis of the representative three-dimensional object models stored in the representative three-dimensional object model storage section;

an image matching step of calculating a similarity between the input image and each of the comparison images generated at the image generation step, selecting a maximum similarity with respect to comparison images associated with each representative three-dimensional object model, and regarding the maximum similarity as a similarity between the input image and the representative three-dimensional object model;

a step of storing the reference images of objects in a reference image storage section;

a step of storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, in a reference image matching result storage section;

a result matching step of extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated at the image matching step and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section;

a step of storing reference three-dimensional object models associated with the reference images stored in the reference image storage section, in a reference three-dimensional object model storage section;

a second image generation step of obtaining reference three-dimensional object models associated with reference images extracted at the result matching step, from the reference three-dimensional object model storage section, and generating at least one second comparison

image close in input condition to the input image every reference three-dimensional object model on the basis of the obtained reference three-dimensional object models; and

a second image matching step of calculating similarities between the input image and second comparison images generated at the second image generation step, selecting a maximum similarity from among second comparison images associated with each of the reference three-dimensional object models, and regarding the maximum similarity as a similarity between the input image and the reference three-dimensional object model.

29. (original): The image matching method according to claim 28, further comprising:

a three-dimensional object model registration step of registering representative three-dimensional object models in the representative three-dimensional object model storage section;

a reference image registration step of registering reference images in the reference image storage section; and

a reference image matching result update step of conducting calculation of the similarities using the image matching means, on a combination of a reference image and a representative three-dimensional object model newly generated by registration, when a new representative three-dimensional object model is registered in the representative three-dimensional object model storage section at the three-dimensional object model registration step, or when a new reference image is registered in the reference image storage section at the reference image registration step, and adding a result of the calculation to results in the reference image matching result storage section; and

a three-dimensional object model generation step of, in response to registration of a similarity between the reference image and the representative three-dimensional object model in the reference image matching result storage section conducted at the reference image matching result update step, generating the reference three-dimensional object model associated with the reference image by combining the representative three-dimensional object models stored in the representative three-dimensional object model storage section on the basis of the similarity, and registering the generated reference three-dimensional object model in the reference three-dimensional object model storage section.

30. (original): The image matching method according to claim 29, wherein at the three-dimensional object model generation step, a reference three-dimensional object model associated with each reference image is generated by combining representative three-dimensional object models stored in the representative three-dimensional object model storage section every partial region, on the basis of similarities obtained every partial region between reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, and the generated reference three-dimensional object model is registered in the reference three-dimensional object model storage section.

31. (original): The image matching method according to claim 28, wherein at the image matching step, a similarity between the input image and a representative three-dimensional object model is calculated every partial region,

the reference image matching result storage section stores similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, every partial region, and

at the result matching step, the reference image similar to the input image is extracted on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means every partial region and similarities between the reference images and the representative three-dimensional object models, stored in the reference image matching result storage section every partial region.

32. (original): The image matching method according to claim 28, wherein at the result matching step, similarities between similarities between the input image and the representative three-dimensional object models and similarities between the reference images and the representative three-dimensional object models are calculated, and in the calculation, the resultant similarities are provided with weights on the basis of candidate precedence of similarities between the input image and the comparison images and the representative three-dimensional object models.

33. (original): The image matching method according to claim 22, comprising:
an image input step of inputting the input image;
a step of storing a plurality of representative three-dimensional object models in a representative three-dimensional object model storage section;

an image generation step of generating at least one comparison image close in input condition to the input image every representative three-dimensional object model on the basis of the representative three-dimensional object models stored in the representative three-dimensional object model storage section;

an image matching step of calculating a similarity between the input image and each of the comparison images generated at the image generation means, selecting a maximum similarity with respect to comparison images associated with each representative three-dimensional object model, and regarding the maximum similarity as a similarity between the input image and the representative three-dimensional object model;

a step of storing the reference images of objects in a reference image storage section;

a step of storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, in a reference image matching result storage section;

a result matching step of extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated at the image matching step and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section;

a step of storing reference three-dimensional object models associated with the reference images stored in the reference image storage section, in a reference three-dimensional object model storage section;

an image conversion step of obtaining reference three-dimensional object models associated with reference images extracted at the result matching step, from the reference three-dimensional object model storage section, squaring an input condition of the input image with that of the reference image extracted at the result matching step by converting the input image and/or the reference image extracted at the result matching step, on the basis of the obtained reference three-dimensional object models, and generating partial images respectively of the input image and the reference image squared in input condition with each other; and

a partial image matching step of calculating a similarity between the partial image of the input image and the partial image of the reference image generated at the image conversion step.

34. (original): The image matching method according to claim 33, further comprising:

a three-dimensional object model registration step of registering representative three-dimensional object models in the representative three-dimensional object model storage section;

a reference image registration step of registering reference images in the reference image storage section; and

a reference image matching result update step of conducting calculation of the similarities at the image matching step, on a combination of a reference image and a

representative three-dimensional object model newly generated by registration, when a new representative three-dimensional object model is registered in the representative three-dimensional object model storage section at the three-dimensional object model registration step, or when a reference image is registered in the reference image storage section at the reference image registration step, and adding a result of the calculation to results in the reference image matching result storage section; and

a three-dimensional object model generation step of, in response to registration of a similarity between the reference image and the representative three-dimensional object model in the reference image matching result storage section conducted at the reference image matching result update step, for generating the reference three-dimensional object model associated with the reference image by combining the representative three-dimensional object models stored in the representative three-dimensional object model storage section on the basis of the similarity, and registering the generated reference three-dimensional object model in the reference three-dimensional object model storage section.

35. (currently amended): The image matching method according to claim 34, wherein at the three-dimensional object model generation step, a reference three-dimensional object model associated with each reference image is generated by combining representative three-dimensional object models stored in the representative three-dimensional object model storage section every partial region, on the basis of similarities obtained every partial region between reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage

section, and the generated reference three-dimensional object model is registered in the reference three-dimensional object model storage section.

36. (original): The image matching method according to claim 33, wherein at the image matching step, a similarity between the input image and a representative three-dimensional object model is calculated every partial region, the reference image matching result storage section stores similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, every partial region, and

at the result matching step, the reference image similar to the input image is extracted on the basis of similarities between the input image and the representative three-dimensional object models calculated at the image matching step every partial region and similarities between the reference images and the representative three-dimensional object models, stored in the reference image matching result storage section every partial region.

37. (original): The image matching method according to claim 33, wherein at the result matching step, similarities between similarities between the input image and the representative three-dimensional object models and similarities between the reference images and the representative three-dimensional object models are calculated, and in the calculation, the resultant similarities are provided with weights on the basis of candidate precedence of similarities between the input image and the comparison images and the representative three-dimensional object models.

38. (original): The image matching method according to claim 20, wherein the object is a human face.

39. (original): A program for making a computer execute an image matching method to retrieve a reference image similar to an input image, the image matching method comprising:

a step of making a match between the input image and a plurality of representative three-dimensional object models;

a step of making a match between the reference image and the representative three-dimensional object models; and

a step of retrieving the reference image similar to the input image by using a result of the match between the input image and the representative three-dimensional object models and a result of the match between the reference image and the representative three-dimensional object models.

40. (original): The image matching program according to claim 39, the image matching method further comprising:

a step of finding a reference three-dimensional object model associated with the reference image similar to the input image; and

a step of newly retrieving the reference image similar to the input image by using the reference three-dimensional object model and the input image.

41. (original): The image matching program according to claim 39, the image matching method further comprising the steps of:

a step of finding a reference three-dimensional object model associated with the reference image similar to the input image;

a conversion step of squaring an input condition of the input image with that of the reference image by converting the input image and/or the reference image on the basis of the reference three-dimensional object model; and

a step of retrieving the reference image associated with the input image by making a match between the input image and reference image squared in input condition.

42. (original): The image matching program according to claim 41, wherein at the conversion step, the reference image is previously converted, and an input condition of the input image is squared with that of the reference image.

43. (original): The image matching program according to claim 39, the image matching method comprising:

an image input step of inputting the input image;

a step of storing a plurality of representative three-dimensional object models in a representative three-dimensional object model storage section;

an image generation step of generating at least one comparison image close in input condition to the input image every representative three-dimensional object model on the basis of the representative three-dimensional object models stored in the representative three-dimensional object model storage section;

an image matching step of calculating a similarity between the input image and each of the comparison images generated by the image generation means, selecting a maximum similarity with respect to comparison images associated with each representative three-dimensional object model, and regarding the maximum similarity as a similarity between the input image and the representative three-dimensional object model;

a step of storing the reference images of objects in a reference image storage section;

a step of storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, in a reference image matching result storage section; and

a result matching step of extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section.

44. (original): The image matching program according to claim 43, the image matching method further comprising:

a three-dimensional object model registration step of registering representative three-dimensional object models in the representative three-dimensional object model storage section;

a reference image registration step of registering reference images in the reference image storage section; and

a reference image matching result update step of conducting calculation of the similarities using the image matching means, on a combination of a reference image and a representative three-dimensional object model newly generated by registration, when a new representative three-dimensional object model is registered in the representative three-dimensional object model storage section by the three-dimensional object model registration means, or when a new reference image is registered in the reference image storage section by the reference image registration means, and adding a result of the calculation to results in the reference image matching result storage section.

45. (original): The image matching program according to claim 43, wherein at the image matching step, a similarity between the input image and a representative three-dimensional object model is calculated every partial region, the reference image matching result storage section stores similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, every partial region, and

at the result matching step, the reference image similar to the input image is extracted on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means every partial region and similarities between the reference images and the representative three-dimensional object models, stored in the reference image matching result storage section every partial region.

46. (original): The image matching program according to claim 43, wherein at the result matching step, similarities between similarities between the input image and the representative three-dimensional object models and similarities between the reference images and the representative three-dimensional object models are calculated, and in the calculation the resultant similarities are provided with weights on the basis of candidate precedence of similarities between the input image and the comparison images and the representative three-dimensional object models.

47. (original): The image matching program according to claim 40, the image matching method comprising:

an image input step of inputting the input image;

a step of storing a plurality of representative three-dimensional object models in a representative three-dimensional object model storage section;

an image generation step of generating at least one comparison image close in input condition to the input image every representative three-dimensional object model on the basis of the representative three-dimensional object models stored in the representative three-dimensional object model storage section;

an image matching step of calculating a similarity between the input image and each of the comparison images generated at the image generation step, selecting a maximum similarity with respect to comparison images associated with each representative three-dimensional object model, and regarding the maximum similarity as a similarity between the input image and the representative three-dimensional object model;

a step of storing the reference images of objects in a reference image storage section;

a step of storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, in a reference image matching result storage section;

a result matching step of extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated at the image matching step and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section;

a step of storing reference three-dimensional object models associated with the reference images stored in the reference image storage section, in a reference three-dimensional object model storage section;

a second image generation step of obtaining reference three-dimensional object models associated with reference images extracted at the result matching step, from the reference three-dimensional object model storage section, and generating at least one second comparison image close in input condition to the input image every reference three-dimensional object model on the basis of the obtained reference three-dimensional object models; and

a second image matching step of calculating similarities between the input image and second comparison images generated at the second image generation step, selecting a maximum similarity from among second comparison images associated with each of the

reference three-dimensional object models, and regarding the maximum similarity as a similarity between the input image and the reference three-dimensional object model.

48. (original): The image matching program according to claim 47, the image matching method further comprising:

a three-dimensional object model registration step of registering representative three-dimensional object models in the representative three-dimensional object model storage section;

a reference image registration step of registering reference images in the reference image storage section; and

a reference image matching result update step of conducting calculation of the similarities using the image matching means, on a combination of a reference image and a representative three-dimensional object model newly generated by registration, when a new representative three-dimensional object model is registered in the representative three-dimensional object model storage section at the three-dimensional object model registration step, or when a new reference image is registered in the reference image storage section at the reference image registration step, and adding a result of the calculation to results in the reference image matching result storage section; and

a three-dimensional object model generation step of, in response to registration of a similarity between the reference image and the representative three-dimensional object model in the reference image matching result storage section conducted at the reference image matching result update step, generating the reference three-dimensional object model associated with the reference image by combining the representative three-dimensional object models

stored in the representative three-dimensional object model storage section on the basis of the similarity, and registering the generated reference three-dimensional object model in the reference three-dimensional object model storage section.

49. (original): The image matching program according to claim 48, wherein at the three-dimensional object model generation step, a reference three-dimensional object model associated with each reference image is generated by combining representative three-dimensional object models stored in the representative three-dimensional object model storage section every partial region, on the basis of similarities obtained every partial region between reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, and the generated reference three-dimensional object model is registered in the reference three-dimensional object model storage section.

50. (original): The image matching program according to claim 47, wherein at the image matching step, a similarity between the input image and a representative three-dimensional object model is calculated every partial region, the reference image matching result storage section stores similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, every partial region, and

at the result matching step, the reference image similar to the input image is extracted on the basis of similarities between the input image and the representative three-dimensional object models calculated by the image matching means every partial region and similarities between the reference images and the representative three-dimensional object models, stored in the reference image matching result storage section every partial region.

51. (original): The image matching program according to claim 47, wherein at the result matching step, similarities between similarities between the input image and the representative three-dimensional object models and similarities between the reference images and the representative three-dimensional object models are calculated, and in the calculation, the resultant similarities are provided with weights on the basis of candidate precedence of similarities between the input image and the comparison images and the representative three-dimensional object models.

52. (original): The image matching program according to claim 41, the image matching method comprising:

an image input step of inputting the input image;
a step of storing a plurality of representative three-dimensional object models in a representative three-dimensional object model storage section
an image generation step of generating at least one comparison image close in input condition to the input image every representative three-dimensional object model on the basis of the representative three-dimensional object models stored in the representative three-dimensional object model storage section;

an image matching step of calculating a similarity between the input image and each of the comparison images generated at the image generation step, selecting a maximum similarity with respect to comparison images associated with each representative three-dimensional object model, and regarding the maximum similarity as a similarity between the input image and the representative three-dimensional object model;

a step of storing the reference images of objects in a reference image storage section;

a step of storing similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, in a reference image matching result storage section;

a result matching step of extracting the reference image similar to the input image on the basis of similarities between the input image and the representative three-dimensional object models calculated at the image matching step and similarities between the reference images and the representative three-dimensional object models stored in the reference image matching result storage section;

a step of storing reference three-dimensional object models associated with the reference images stored in the reference image storage section, in a reference three-dimensional object model storage section;

an image conversion step of obtaining reference three-dimensional object models associated with reference images extracted at the result matching step, from the reference three-dimensional object model storage section, squaring an input condition of the input image with that of the reference image extracted at the result matching step by converting the input image

and/or the reference image extracted at the result matching step, on the basis of the obtained reference three-dimensional object models, and generating partial images respectively of the input image and the reference image squared in input condition with each other; and

a partial image matching step of calculating a similarity between the partial image of the input image and the partial image of the reference image generated at the image conversion step.

53. (original): The image matching program according to claim 52, the image matching method further comprising:

a three-dimensional object model registration step of registering representative three-dimensional object models in the representative three-dimensional object model storage section;

a reference image registration step of registering reference images in the reference image storage section; and

a reference image matching result update step of conducting calculation of the similarities at the image matching step, on a combination of a reference image and a representative three-dimensional object model newly generated by registration, when a new representative three-dimensional object model is registered in the representative three-dimensional object model storage section at the three-dimensional object model registration step, or when a reference image is registered in the reference image storage section at the reference image registration step, and adding a result of the calculation to results in the reference image matching result storage section; and

a three-dimensional object model generation step of, in response to registration of a similarity between the reference image and the representative three-dimensional object model in the reference image matching result storage section conducted at the reference image matching result update step, for generating the reference three-dimensional object model associated with the reference image by combining the representative three-dimensional object models stored in the representative three-dimensional object model storage section on the basis of the similarity, and registering the generated reference three-dimensional object model in the reference three-dimensional object model storage section.

54. (original): The image matching program according to claim 53, wherein at the three-dimensional object model generation step, a reference three-dimensional object model associated with each reference image is generated by combining representative three-dimensional object models stored in the representative three-dimensional object model storage section every partial region, on the basis of similarities obtained every partial region between reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, and the generated reference three-dimensional object model is registered in the reference three-dimensional object model storage section.

55. (currently amended): The image matching program according to claim 52, wherein at the image matching ~~means~~ step, a similarity between the input image and a representative three-dimensional object model is calculated every partial region,

the reference image matching result storage section stores similarities between the reference images stored in the reference image storage section and representative three-dimensional object models stored in the representative three-dimensional object model storage section, every partial region, and

at the result matching ~~means~~ step, the reference image similar to the input image is extracted on the basis of similarities between the input image and the representative three-dimensional object models calculated at the image matching step every partial region and similarities between the reference images and the representative three-dimensional object models, stored in the reference image matching result storage section every partial region.

56. (original): The image matching program according to claim 52, wherein
at the result matching step, similarities between similarities between the input image and the representative three-dimensional object models and similarities between the reference images and the representative three-dimensional object models are calculated, and in the calculation, the resultant similarities are provided with weights on the basis of candidate precedence of similarities between the input image and the comparison images and the representative three-dimensional object models.

57. (original): The image matching program according to claim 39, wherein the object is a human face.